

Bird Biodiversity in the Nature Reserves of Singapore

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Abstract

Forest clearance and associated disturbance since 1819 are chiefly responsible for the loss of 70 species from the forest habitat in Singapore. Of the remaining 207 species, 127 are resident of which only 26 are forest dependent. The rest include 72 migrants and 8 non-breeding visitors. A comprehensive survey of the central forests, the last of the terrestrial forests in Singapore, was conducted by members of the Nature Society (Singapore) Bird Group between July 1993 and June 1997, and increased the known species total for the area from 171 in 1989 to 207 by 1997. The 35 additions to the Nature Reserves list included one new to Singapore, Velvet-fronted Nuthatch, and rediscoveries of White-bellied Woodpecker, the first since 1988, Barred Eagle-owl, since 1925 and Yellow-eared Spiderhunter, since 1920. Of 19 key species, 14 were recorded during the survey of which four - Drongo Cuckoo, Blue-rumped Parrot, Blue-crowned Hanging Parrot and Chestnut-winged Babbler - were found to be widespread within the Central Catchment Nature Reserve. Four areas found to be of importance because of high species diversity and concentration of key species were the MacRitchie peninsula, the Mandai Track 15 peninsula, Nee Soon Swamp Forest and the hill primary forest at Bukit Timah Nature Reserve. Conservation and protection of these areas and the control of poaching and illegal introduction of alien birds are the keys to the preservation of the current forest bird diversity and the prevention of further extinction.

Introduction

The central forests consist of two nature reserves in the centre of Singapore: the 2,675 ha Central Catchment Nature Reserve and the recently enlarged 164 ha Bukit Timah Nature Reserve (National Parks Board, *pers. comm.*). These reserves constitute the last remnant of a rainforest habitat that once covered the island and are important as last refuges for many resident bird species. This shrinkage and associated disturbance, which began with the arrival of Stamford Raffles in 1819, resulted in the extinction of 70 resident species that included entire families, such as partridges, hornbills, trogons and broadbills (Lim, 1992, 1997). Other families, normally well represented in the forest habitats of the Sunda region, became very much reduced. These included bulbuls and babblers, with some reduced to just one representative species, e.g., barbets and malkohas (Lim, 1992, 1997).

History

The study of birds in Singapore began with Raffles who collected birds for the British Museum (Lim, 1997). Raffles was followed by Alfred Russel Wallace who collected in Singapore between 1854 and 1862, A.O. Hume (1879-1880), H.R. Kelham (1881—1882) and H.N. Ridley (1898—1901). There followed a lull after which the collecting tradition continued with the arrival of erstwhile curators of the Raffles Museum, F.N. Chasen in the 1920s and 1930s and C.A. Gibson-Hill in the 1940s (Bucknill & Chasen, 1927; Gibson-Hill, 1950). Gibson-Hill and his contemporary, R.J. Spittle, made the first life history studies of birds in Singapore during their World War II internment and were succeeded in 1968 by P. Ward who conducted the first avifaunal studies. However, it was not until the arrival of C.J. Hails in 1983 that the first systematic study of forest birds was carried out. His findings were published in 1987 (Hails & Jarvis, 1987; Hails, 1992). There were no subsequent studies until the National Parks Board's sponsored bird survey which began in 1993 with the participation of volunteers from the Nature Society (Singapore).

Survey Objectives

The Nature Society (Singapore) Bird Group commenced a study of the central forests in July 1993 at the invitation of the National Parks Board (NParks). The field survey took some 48 months to complete and members expended over 1,500 observer-hours during the study. The survey was done in four stages as follows:

MacRitchie Catchment (MC)	: July 1993 - June 1994
Seletar Catchment (SC)	: July 1994 - June 1995
Peirce Catchment (PC)	: July 1995 - June 1996
Bukit Timah (BT)	: July 1996 - June 1997

The objectives of the survey were:

1. to determine the status, diversity, density and population of birds in the Nature Reserves,
2. to map the occurrence of key species (nationally threatened forest dependent species),
3. to recommend methods of maintaining/improving current bird diversity, and
4. to identify areas of high bird diversity.

Materials and Methods

To facilitate a uniform and thorough coverage, the central forests were divided into four parts, each taking one year to complete. In turn, each part was further divided into five smaller sectors (Figure 1), each being supervised by an experienced birdwatcher with the aid of 1–5 assistants.

The methods employed were as follows:

Line transect counts

Line transects were selected from existing trails within each area and designed to be representative of the vegetation type of each sector. The transects varied in length from 0.8 km to 2.3 km.

Two types of transect counts were used: diurnal and nocturnal. Diurnal transect counts were carried out monthly, commencing at 0730 hours and ending at approximately 0830 to 0930 hours, depending on the length of each transect and bird activity. Nocturnal transect counts were also made at less frequent intervals commencing at 1930 hours and ending at approximately 2030 to 2130 hours.

Birds seen or heard during the transect counts were recorded using the 25-metre belt method and an estimation of the population and density derived using the methods recommended by Bibby *et al.* (1992).

The formula used to calculate species density is $D = Nk/L$

where D = density

N = total number of birds counted

k = unknown constant = $[1 - \text{SQR}(1-p)]/W$

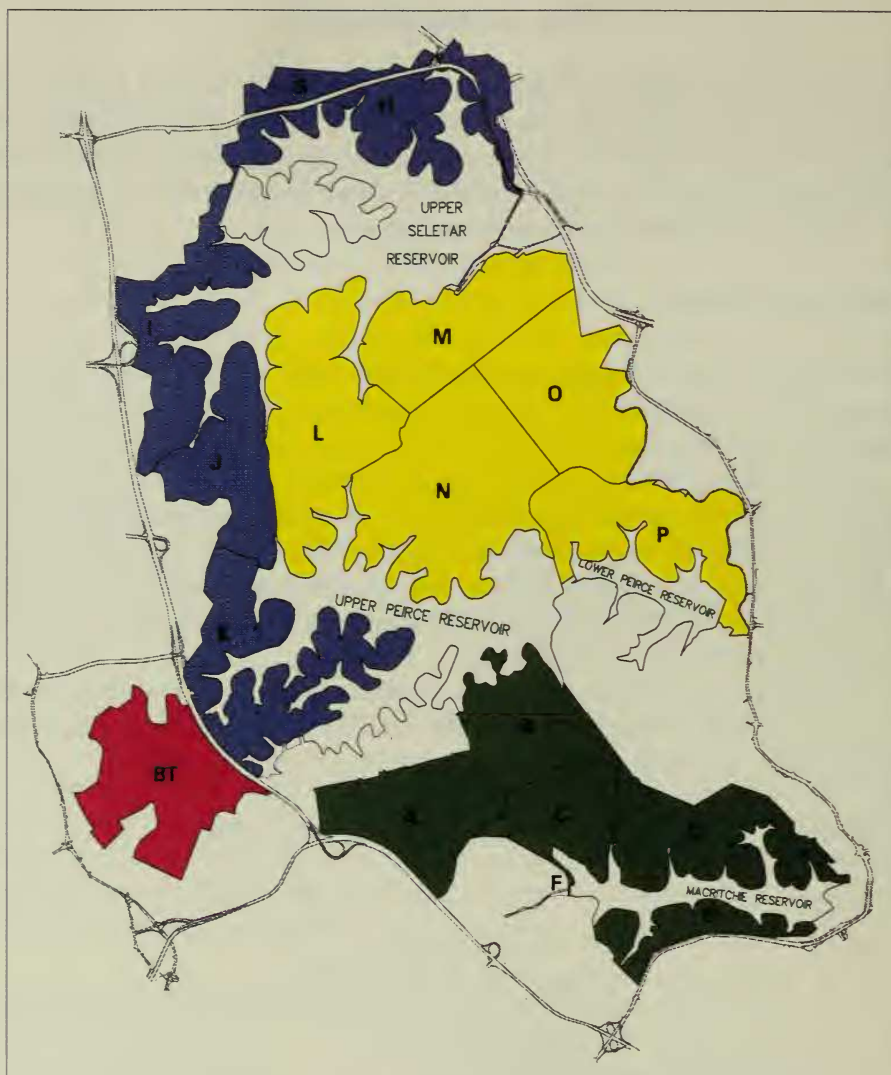
$[p = N_1/N$ where N_1 is the total number of birds counted in the inner belt; W = belt width (m)]

L = length of transect (m)

This formula is based on the assumption that all birds occurring within the transect route are counted and that detectability (the k factor) decreases linearly with distance.

Area counts

Line transects are by design confined to a particular route and time. In order that bird diversity and distribution of each area be properly recorded, additional area counts were conducted by the area leaders either before or



- MacRitchie Catchment (MC)**
 consisting of Sectors A, B, C, D, E & F.
- Seletar Catchment (SC)**
 consisting of Sectors G, H, I, J & K.
- Peirce Catchment (PC)**
 consisting of Sectors L, M, N, O & P.
- Bukit Timah (BT)**

Figure 1. Map showing sectors surveyed in the Nature Reserves.

after line transect counts or on a separate date. Data so obtained were recorded in designated field survey forms and submitted.

Mapping

Mapping of the ranges of key species was conducted for those recorded in transect and area counts on an area-by-area basis. The aim of this mapping study was to determine the occurrence and distribution of key species in each area so that these could be transferred to the NParks' Geographic Information System for future threatened species management and conservation purposes.

Bird ringing

Bird ringing using mist nets and rings belonging to NParks was carried out in order to study the movement and longevity of resident birds and the migration patterns of migrants. Nets were set up along existing trails in the early morning (by 0600 hours) and taken down at noon.

Birds caught in the net were quickly ringed, measured, photographed and released near the site where they were caught.

Results

Annotated checklist of selected species

The following is an annotated checklist of species that are nationally threatened, forest dependent (stenotopic) or key species.

White-bellied Woodpecker (*Dryocopus javensis*)

Large wood-boring insectivore, the only extant stenotopic picid, nationally threatened. Frequents canopy and mid-storey, particularly dead trees. Confined to the MacRitchie Catchment and Bukit Timah Nature Reserve. No more than 2 individuals seen since 1993.

Red-crowned Barbet (*Megalaima rafflesii*)

Large frugivore, the only extant stenotopic barbet, nationally near-threatened. Frequents canopy and upper storey. Occurs only in the Central Catchment and Bukit Timah Nature Reserves. Breeding recorded.

Blue-eared Kingfisher (*Alcedo meninting*)

Small piscivorous kingfisher restricted to forest streams; nationally

threatened. Confined to the Central Catchment Nature Reserve with regular sightings in the MacRitchie area. Breeding recorded in 1997.

Drongo Cuckoo (*Surniculus lugubris*)

Small insectivore favouring the canopy; nationally threatened. Occurs widely throughout Central Catchment and Bukit Timah Nature Reserves. Breeding recorded. Numbers are augmented by winter visitors between October and March.

Chestnut-bellied Malkoha (*Phaenicophaeus sumatranus*)

Large insectivore frequenting all levels from lower storey to canopy, the only extant malkoha; nationally near-threatened. Occurs in both reserves. Breeding recorded.

Blue-rumped Parrot (*Psittinus cyanurus*)

Small frugivore frequenting canopy; nationally threatened. Occurs in both reserves. Breeding not confirmed.

Blue-crowned Hanging Parrot (*Loriculus galgulus*)

Very small frugivore of the canopy; nationally threatened. Occurs in both reserves. Breeding not confirmed.

Glossy Swiftlet (*Collocalia esculenta*)

Very small aerial insectivore of the airspace above forests. Confined to the summit of Bukit Timah. Not recorded since 1990. Breeding not confirmed. Not recorded during the survey.

Brown Hawk-owl (*Ninox scutulata*)

Small insectivore/carnivore; nocturnal; forest stenotopic; common. Frequents the understorey. Occurs throughout the nature reserves. Breeding recorded.

Malaysian Eared-nightjar (*Eurostopodus temminckii*)

Medium-sized aerial insectivore; crepuscular; forest stenotopic; nationally threatened. Feeds over forest canopy and edges. Confined to Central Catchment. Breeding not confirmed.

Crested Serpent-eagle (*Spilornis cheela*)

Large raptor of reptiles and amphibians; forest stenotopic; nationally threatened. Feeds over canopy. Confined to Central Catchment Nature Reserve. Breeding recorded.

Asian Fairy-bluebird (*Irena puella*)

Small frugivore of forest canopy; forest stenotopic; common. Occurs in both reserves. Breeding recorded.

Greater Green Leafbird (*Chloropsis sonnerati*)

Small frugivore of canopy; forest stenotopic; nationally threatened. Occurs in both reserves. Breeding not confirmed.

Lesser Green Leafbird (*Chloropsis cyanopogon*)

Small frugivore of canopy; forest stenotopic; nationally threatened. Occurs in both reserves. Breeding not confirmed.

Lesser Cuckoo-shrike (*Coracina fimbriata*)

Small insectivore of canopy and upper storey; forest stenotopic; nationally threatened. Confined to Bukit Timah Nature Reserve. Not recorded during survey. Breeding not confirmed.

Scarlet Minivet (*Pericrocotus flammeus*)

Small insectivore of canopy; forest stenotopic; nationally threatened. Confined to Bukit Timah Nature Reserve. Breeding recorded.

Black-headed Bulbul (*Pycnonotus atriceps*)

Small frugivore of upper storey; forest stenotopic; nationally threatened. Confined to Central Catchment Nature Reserve. Breeding not confirmed.

Cream-vented Bulbul (*Pycnonotus simplex*)

Small frugivore of mid and lower storeys; forest stenotopic; nationally near-threatened. Occurs in both reserves. Breeding recorded.

Red-eyed Bulbul (*Pycnonotus brunneus*)

Small frugivore of mid and lower storeys; forest stenotopic; nationally threatened. Occurs in both reserves. Breeding recorded.

Buff-vented Bulbul (*Iole olivacea*)

Small frugivore of middle and lower storeys; forest stenotopic; nationally threatened. Confined to Bukit Timah Nature Reserve. Not recorded during the survey. Breeding not confirmed.

Short-tailed Babbler (*Malacocincla malaccensis*)

Small insectivore of forest floor and understorey; forest stenotopic; common. Occurs in both reserves. Breeding recorded.

Moustached Babbler (*Malacopteron magnirostre*)

Small insectivore of understorey; forest stenotopic; nationally threatened. Confined to Central Catchment Nature Reserve. Breeding recorded.

Chestnut-winged Babbler (*Stachyris erythroptera*)

Small insectivore of understorey (especially, resam *Dicranopteris* spp.) frequently seen with Striped Tit-babbler; forest stenotopic; nationally threatened. Occurs in both reserves but rare in Bukit Timah Nature Reserve. Breeding recorded.

Yellow-vented Flowerpecker (*Dicaeum chrysorrheum*)

Very small frugivore/insectivore of understorey to canopy; forest stenotopic; nationally threatened. Occurs in both reserves but not recorded during the survey. Breeding recorded.

Little Spiderhunter (*Arachnothera longirostris*)

Small insectivore/nectarivore of understorey; forest stenotopic; uncommon. Occurs in both reserves. Breeding recorded.

Thick-billed Spiderhunter (*Arachnothera crassirostris*)

Small insectivore/nectarivore of canopy; forest stenotopic; nationally threatened. Confined to Central Catchment Nature Reserve. Not recorded since 1989. Breeding not confirmed.

Yellow-eared Spiderhunter (*Arachnothera chrysogenys*)

Small insectivore/nectarivore of canopy; forest stenotopic; nationally threatened. Confined to Central Catchment Nature Reserve. Breeding not confirmed.

The avifauna

As a result of this survey, 207 species of birds are now known to occur in the Nature Reserves (Appendix 1). Although this is only 59% of the national total i.e., 350 (Lim & Gardner, 1997), the Nature Reserves are home to all 26 extant forest specialists, 40 (75%) of the nationally threatened species (Lim, 1992) and 2 globally threatened species (Collar *et al.*, 1994). This is about 75–80% of the species total of lowland forests of similar size, such as Panti Forest Reserve, Johor and Pasoh Forest Reserve in Negri Sembilan, in Peninsular Malaysia (*pers. obs.*). The most important factor for this impoverishment is the loss of 70 resident species, which if added to the total, would be approximately 100%, in terms of number of species one would expect to record in a Peninsular Malaysian forest of similar size. However, one important difference is dominance of generalist

(eurytopic) species, 101 species (about 80%) of the resident species. In a mainland forest, the percentage of eurytopics would be about 25% (*pers. obs.*; Medway & Wells, 1976). Contributing factors are that Singapore is an island and many species are not able to cross the narrow Johor Straits and the history of land clearance, which created opportunities for open country species to invade forest niches left vacant by extirpated forest species.

During the four-year survey, from July 1993 to June 1997, a total of 175 species (85% of the species total), were recorded from both reserves. The Central Catchment Nature Reserve's bird list increased from 155 to 185 species, an increase of 30 species or 19%. Of the grand total, 170 or 92% were recorded during the survey, with 16 species not detected. Of the 17 key species that had been observed in Central Catchment Nature Reserve, 13 (76%) were recorded during the survey (Table 1). Of the 35 nationally threatened species observed in Central Catchment Nature Reserve, 25 (71%) were recorded. The bird list for Bukit Timah Nature Reserve and its extension increased from 117 to 143, an increase of 26 species or 22%. Of these, 114 were found during the survey, with 29 not detected. Of the 13 key species that had been observed in Bukit Timah Nature Reserve, 8 (62%) were recorded during the survey (Table 1). Of the 21 nationally threatened species previously observed in Bukit Timah Nature Reserve, 15 (71%) were recorded.

Table 1. Distribution of key species in the Nature Reserves.

(MC – MacRitchie Catchment, SC – Seletar Catchment, PC – Peirce Catchment, BT – Bukit Timah)

No.	Common Name	MC	SC	PC	BT
1.	White-bellied Woodpecker	*			
2.	Blue-eared Kingfisher	*	*		
3.	Drongo Cuckoo	*	*	*	*
4.	Blue-rumped Parrot	*	*	*	*
5.	Blue-crowned Hanging Parrot	*	*	*	*
6.	Malaysian Eared-nightjar	*	*	*	
7.	Glossy Swiftlet				
8.	Crested Serpent-eagle	*	*		
9.	Greater Green Leafbird	*			*
10.	Lesser Green Leafbird	*		*	*
11.	Lesser Cuckoo-shrike				
12.	Scarlet Minivet				*
13.	Black-headed Bulbul	*	*		
14.	Red-eyed Bulbul	*		*	*
15.	Buff-vented Bulbul				
16.	Moustached Babbler	*			
17.	Chestnut-winged Babbler	*	*	*	*
18.	Yellow-vented Flowerpecker				
19.	Thick-billed Spiderhunter				

Bird status

Of the 207 bird species recorded in the nature reserves, 127 (61%) are residents, 72 (35%) are migrants and 8 (4%) are non-breeding visitors. Of the total of 185 species recorded in the catchment, 120 (65%) are residents, 65 (35%) are migrants with 1 (1%) non-breeding visitor. For Bukit Timah, its 143 species comprised 91 residents (64%), 47 (33%) migrants and 5 (4%) non-breeding visitors.

Key species

Of the 19 key species, all but 5 species were recorded (Table 1). Of these five, the Glossy Swiftlet was last recorded in 1990, Lesser Cuckoo-shrike in 1986, Buff-vented Bulbul in 1991, Yellow-vented Flowerpecker in 1990 and Thick-billed Spiderhunter in 1989. All but the last-named species are confined to Bukit Timah.

Of the 14 key species recorded, only 4 species - Drongo Cuckoo, Blue-rumped Parrot, Blue-crowned Hanging Parrot and Chestnut-winged Babbler - are relatively widespread and occur in all four areas. The remaining 12 species live a precarious existence, especially those which number less than 5 individuals and occur in a single area, e.g., White-bellied Woodpecker (MacRitchie) and Scarlet Minivet (Bukit Timah).

New discoveries

The survey added several species to the list of the Nature Reserves. Noteworthy amongst these were Large Hawk-cuckoo, Oriental Cuckoo, Red-legged Crake and Velvet-fronted Nuthatch. Stunning rediscoveries included White-bellied Woodpecker (first since 1988), Barred Eagle-owl (1925) and Yellow-eared Spiderhunter (1920). Most of the other additions were forest edge, parkland or open country species recorded within reserve boundaries, e.g., Lower Peirce, Bukit Timah extension.

Other findings

The globally threatened Straw-headed Bulbul appears to be invading from the Sembawang area, being recorded in sectors G, I, P, K and the Bukit Timah extension. The Black-headed Bulbul also occurs in both Chestnut Avenue sectors in addition to its known presence in MacRitchie. Another nationally threatened species, Crested Serpent-eagle is present in E, I, M, N and O. The little known Malaysian Eared-nightjar is also recorded in sectors H, I and P in addition to MacRitchie. Yet another locally threatened

species, Little Green-pigeon, has not been recorded in the central forests or anywhere else in Singapore since it was last seen in the Seletar Catchment in 1992.

Breakdown by areas

Based on the survey results, the bird inventory of the four forest areas is given below:

Areas	Species recorded	Key species
MacRitchie Catchment (MC)	121	13
Seletar Catchment (SC)	114	8
Peirce Catchment (PC)	96	7
Bukit Timah (BT)	114	8

Breakdown by sectors

The following is a breakdown of the individual sectors and their species count (with numbers of key species in parenthesis):

A – 49 (2)	G – 45 (1)	M – 48 (4)
B – 68 (9)	H – 46 (4)	N – 56 (3)
C – 62 (5)	I – 66 (4)	O – 62 (4)
D – 65 (8)	J – 56 (2)	P – 55 (3)
E – 52 (2)	K – 58 (2)	BT – 111 (8)
F – 62 (1)	L – 52 (5)	

- High diversity - B, I, D, C, O, BT
High key species - B, D, C, I, H, L, M, O, BT.
High diversity and high key species - B, C, D, I, O, BT.

From this simple comparison, it can be seen that areas of high bird diversity as well as high concentration of key species can be defined as follows:

1. The MacRitchie peninsula comprising sectors B, C & D.
2. The Mandai Track 15 peninsula comprising sector I.
3. The Nee Soon Swamp Forest comprising sector O.
4. Bukit Timah Nature Reserve.

Conclusions

The survey has shown that while some forest dependent species are doing well, having both stable numbers and a wide distribution, virtually all key species exhibit signs of decline. The reasons for this decline are not known but are suspected to be related to the long-term effects of isolation, competition and inbreeding.

Three primary core areas, Bukit Timah, the Sime-Shinto-Thomson peninsula in MacRitchie and Nee Soon Swamp Forest in Peirce, and a secondary one in the Mandai Track 15 area in Seletar, have been identified in the survey. The future of forest dependent, in particular key species, lies in the strict protection of these four sites. In addition, there is a need to ensure that bird populations of the three catchments are allowed to mingle to generate a healthy gene pool by linking intervening waterbodies with corridors and also by conserving adjacent sectors as protective buffers.

The biggest threat to forest birds is unviable population levels for key species and isolation for forest dependent species. A secondary threat is forest clearance and disturbance as these factors result in habitat shrinkage, and the introduction of predators (e.g. mammals) and competitors (generalist birds). A third factor is the introduction of alien birds.

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Appendix 1. A Checklist of the Birds of the Nature Reserves of Singapore.

(Status : R – Resident, M – Migrant, V – Non-breeding Visitor, I – Introduced, ? – Status Uncertain.

Abundance Codes : 1 – Rare, 2 – Common, 3 – Abundant

* - Key species. Species which are nationally threatened and forest dependent.

Location : CCNR – Central Catchment Nature Reserve, BTNR – Bukit Timah Nature Reserve.)

Part A : Species which are believed to be genuinely wild birds.

No.	Common Name	Species	Status	Remarks
1.	Blue-breasted Quail	<i>Coturnix chinensis</i>	R1	
2.	Lesser Whistling-Duck	<i>Dendrocygna javanica</i>	R1	Nationally threatened.
3.	Cotton Pygmy-Goose	<i>Nettapus coromandelianus</i>	R1	Nationally threatened.
4.	Barred Buttonquail	<i>Turnix suscitator</i>	R1	
5.	Sunda Woodpecker	<i>Dendrocopus moluccensis</i>	R2	
6.	Rufous Woodpecker	<i>Celeus brachyurus</i>	R2	
7.	White-bellied Woodpecker*	<i>Dryocopus javensis</i>	R1	
8.	Banded Woodpecker	<i>Picus miniaceus</i>	R3	
9.	Laced Woodpecker	<i>Picus vittatus</i>	R2	
10.	Common Flameback	<i>Dinopium javanense</i>	R1	
11.	Red-crowned Barbet	<i>Megalaima rafflesii</i>	R2	Forest dependent.
12.	Coppersmith Barbet	<i>Megalaima haemacephala</i>	R1	
13.	Dollarbird	<i>Eurystomus orientalis</i>	R2	
14.	Common Kingfisher	<i>Alcedo atthis</i>	M3	
15.	Blue-eared Kingfisher*	<i>Alcedo meninting</i>	R1	Confined to CCNR.
16.	Black-backed Kingfisher	<i>Ceyx erithacus</i>	M1	
17.	Stock-billed Kingfisher	<i>Pelargopsis capensis</i>	R2	
18.	Ruddy Kingfisher	<i>Halcyon coromanda</i>	M1	
19.	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	R3	
20.	Black-capped Kingfisher	<i>Halcyon pileata</i>	M2	
21.	Collared Kingfisher	<i>Todirhamphus chloris</i>	R2	
22.	Blue-throated Bee-eater	<i>Merops viridis</i>	R3	
23.	Blue-tailed Bee-eater	<i>Merops philippinus</i>	M3	
24.	Chestnut-winged Cuckoo	<i>Clamator coromandus</i>	M1	
25.	Large Hawk-cuckoo	<i>Cuculus sparveriioides</i>	M1	
26.	Hodgson's Hawk-cuckoo	<i>Cuculus fugax</i>	M1	
27.	Indian Cuckoo	<i>Cuculus micropterus</i>	M2	
28.	Oriental Cuckoo	<i>Cuculus orientalis</i>	M1	

No.	Common Name	Species	Status	Remarks
29.	Banded Bay Cuckoo	<i>Cacomantis sonneratii</i>	R2	
30.	Plaintive Cuckoo	<i>Cacomantis merulinus</i>	R2	
31.	Rusty-breasted Cuckoo	<i>Cacomantis sepulchralis</i>	R1	Nationally threatened.
32.	Little Bronze-cuckoo	<i>Chrysococcyx minutillus</i>	R1	
33.	Violet Cuckoo	<i>Chrysococcyx xanthorhynchus</i>	R2	Nationally threatened.
34.	Drongo Cuckoo*	<i>Surniculus lugubris</i>	R2	
35.	Asian Koel	<i>Eudynamys scolopacea</i>	R1	
36.	Chestnut-bellied Malkoha	<i>Phaenicophaeus sumatranus</i>	R2	Forest dependent.
37.	Greater Coucal	<i>Centropus sinensis</i>	R2	
38.	Lesser Coucal	<i>Centropus bengalensis</i>	R1	
39.	Tanimbar Cockatoo	<i>Cacatua goffini</i>	IR1	
40.	Blue-rumped Parrot*	<i>Psittinus cyanurus</i>	R1	
41.	Blue-crowned Hanging Parrot*	<i>Loriculus galgulus</i>	R1	
42.	Rose-ringed Parakeet	<i>Psittacula krameri</i>	IR1	
43.	Red-breasted Parakeet	<i>Psittacula alexandri</i>	IR1	
44.	Long-tailed Parakeet	<i>Psittacula longicauda</i>	R3	
45.	Glossy Swiftlet*	<i>Collocalia esculenta</i>	R1	Confined to BTNR.
46.	Black-nest Swiftlet	<i>Collocalia maxima</i>	R3	
47.	Edible-nest Swiftlet	<i>Collocalia fuciphaga</i>	R3	
48.	Silver-backed Needletail	<i>Hirundapus cochinchinensis</i>	M1	
49.	Brown-backed Needletail	<i>Hirundapus giganteus</i>	M1	
50.	Asain Palmswift	<i>Cypsiurus balasiensis</i>	R2	
51.	Fork-tailed Swift	<i>Apus pacificus</i>	M2	
52.	House Swift	<i>Apus nipalensis</i>	R3	
53.	Grey-rumped Treeswift	<i>Hemiprocne longipennis</i>	R2	
54.	Oriental Scops-owl	<i>Otus sunia</i>	M1	
55.	Collared Scops-owl	<i>Otus lempiji</i>	R3	
56.	Barred Eagle-owl	<i>Ketupa ketupu</i>	V1	
57.	Buffy Fish-owl	<i>Ketupa ketupu</i>	R1	Nationally threatened.
58.	Spotted Wood-owl	<i>Strix seloputo</i>	R1	Nationally threatened.
59.	Brown Hawk-owl	<i>Ninox scutulata</i>	R3	Forest dependent.
60.	Malaysian Eared-nightjar*	<i>Eurostopodus temminckii</i>	R1	Confined to CCNR.
61.	Grey Nightjar	<i>Caprimulgus indicus</i>	M1	
62.	Large-tailed Nightjar	<i>Caprimulgus macrurus</i>	R3	
63.	Rock Pigeon	<i>Columba livia</i>	IR2	
64.	Spotted Dove	<i>Streptopelia chinensis</i>	R2	

No.	Common Name	Species	Status	Remarks
65.	Emerald Dove	<i>Chalcophaps indica</i>	R2	
66.	Zebra Dove	<i>Geopelia striata</i>	R1	
67.	Little Green-pigeon	<i>Treron olax</i>	R1	Nationally threatened.
68.	Pink-necked Green-pigeon	<i>Treron vernans</i>	R3	
69.	Thick-billed Green-pigeon	<i>Treron curvirostra</i>	R2	Nationally threatened.
70.	Jambu Fruit-dove	<i>Ptilinopus jambu</i>	V1	
71.	Pied Imperial Pigeon	<i>Ducula bicolor</i>	V1	
72.	Red-legged Crake	<i>Rallina fasciata</i>	R1	Nationally threatened.
73.	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	R1	
74.	Pintail Snipe	<i>Gallinago stenura</i>	M2	
75.	Common Sandpiper	<i>Tringa hypoleucos</i>	M3	
76.	Common Greenshank	<i>Tringa nebularia</i>	M2	
77.	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	M1	
78.	Pacific Golden Plover	<i>Pluvialis fulva</i>	M1	
79.	Oriental Pratincole	<i>Glareola maldivarum</i>	M1	
80.	Little Tern	<i>Sterna albifrons</i>	R2	Nationally threatened.
81.	White-winged Tern	<i>Chlidonias leucopterus</i>	M2	
82.	Osprey	<i>Pandion haliaetus</i>	M2	
83.	Black Baza	<i>Aviceda leuphotes</i>	M2	
84.	Oriental Honey-buzzard	<i>Pernis ptilorhynchus</i>	M2	
85.	Brahiminy Kite	<i>Haliastur indus</i>	R3	
86.	White-bellied Fish-eagle	<i>Haliaeetus leucogaster</i>	R3	
87.	Grey-headed Fish-eagle	<i>Ichthyophaga ichthyaetus</i>	R2	Nationally threatened.
88.	Crested Serpent-eagle*	<i>Spilornis cheela</i>	R1	Confined to CCNR.
89.	Eastern Marsh-harrier	<i>Circus spilonotus</i>	M1	
90.	Himalayan Griffon	<i>Gyps himalayensis</i>	V1	
91.	Crested Goshawk	<i>Accipiter trivirgatus</i>	R1	Nationally threatened.
92.	Chinese Goshawk	<i>Accipiter soloensis</i>	M1	
93.	Japanese Sparrowhawk	<i>Accipiter gularis</i>	M3	
94.	Besra	<i>Accipiter virgatus</i>	V1	
95.	Grey-faced Buzzard	<i>Butastur indicus</i>	M1	
96.	Changeable Hawk-eagle	<i>Spizaetus cirrhatus</i>	R2	Nationally threatened.
97.	Black-thighed Falconet	<i>Microhierax fringillarius</i>	R1	Nationally threatened.
98.	Peregrine Falcon	<i>Falco peregrinus</i>	M1	
99.	Purple Heron	<i>Ardea purpurea</i>	R2	
100.	Great Egret	<i>Casmerodius albus</i>	M1	

No.	Common Name	Species	Status	Remarks
101.	Cattle Egret	<i>Bubulcus ibis</i>	M1	
102.	Chinese Pond-heron	<i>Ardeola bacchus</i>	M1	
103.	Striated Heron	<i>Butorides striatus</i>	R3	
104.	Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	R1	Nationally threatened.
105.	Malayan Night-heron	<i>Gorsachius melanolophus</i>	M1	
106.	Yellow Bittern	<i>Ixobrychus sinensis</i>	M1	
107.	Schrenck's Bittern	<i>Ixobrychus eurhythmus</i>	M1	
108.	Cinnamon Bittern	<i>Ixobrychus cinnamomeus</i>	R1	
109.	Black Bittern	<i>Ixobrychus flavicollis</i>	M1	
110.	Hooded Pitta	<i>Pitta sordida</i>	M1	
111.	Blue-winged Pitta	<i>Pitta moluccensis</i>	M1	
112.	Golden-bellied Gerygone	<i>Gerygone sulphurea</i>	R1	
113.	Asian Fairy-bluebird	<i>Irena puella</i>	R3	Forest dependent.
114.	Greater Green Leafbird*	<i>Chloropsis sonnerati</i>	R1	
115.	Lesser Green Leafbird*	<i>Chloropsis cyanopogon</i>	R2	
116.	Blue-winged Leafbird	<i>Chloropsis cochinchinensis</i>	R3	
117.	Tiger Shrike	<i>Lanius tigrinus</i>	M3	
118.	Brown Shrike	<i>Lanius cristatus</i>	M2	
119.	House Crow	<i>Corvus splendens</i>	R1	
120.	Large-billed Crow	<i>Corvus macrorhynchos</i>	R3	
121.	Black-naped Oriole	<i>Oriolus chinensis</i>	R3	
122.	Lesser Cuckoo-shrike*	<i>Coracina fimbriata</i>	R1	Confined to BTNR.
123.	Pied Triller	<i>Lalage nigra</i>	R2	
124.	Ashy Minivet	<i>Pericrocotus divaricatus</i>	M2	
125.	Scarlet Minivet*	<i>Pericrocotus flammeus</i>	R1	
126.	Pied Fantail	<i>Rhipidura javanica</i>	R1	
127.	Ashy Drongo	<i>Dicrurus leucophaeus</i>	M1	
128.	Crow-billed Drongo	<i>Dicrurus annectans</i>	M2	
129.	Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i>	R3	
130.	Asian Paradise-flycatcher	<i>Terpsiphone paradisi</i>	M2	
131.	Japanese Paradise-flycatcher	<i>Terpsiphone atrocaudata</i>	M1	
132.	Common Iora	<i>Aegithina tiphia</i>	R2	
133.	White-throated Rock-thrush	<i>Monticola gularis</i>	M1	
134.	Blue Rock-thrush	<i>Monticola solitarius</i>	M1	
135.	Orange-headed Thrush	<i>Zoothera citrina</i>	M1	
136.	Siberian Thrush	<i>Zoothera siberica</i>	M1	

No.	Common Name	Species	Status	Remarks
137.	Eyebrowed Thrush	<i>Turdus obscurus</i>	M1	
138.	Brown-chested Jungle-flycatcher	<i>Rhinomyias brunneata</i>	M1	Globally threatened.
139.	Dark-sided Flycatcher	<i>Muscicapa sibirica</i>	M2	
140.	Asian Brown Flycatcher	<i>Muscicapa dauurica</i>	M3	
141.	Ferruginous Flycatcher	<i>Muscicapa ferruginea</i>	M1	
142.	Yellow-rumped Flycatcher	<i>Ficedula zanthopygia</i>	M3	
143.	Narcissus Flycatcher	<i>Ficedula narcissina</i>	M1	
144.	Mugimaki Flycatcher	<i>Ficedula mugimaki</i>	M1	
145.	Blue-and-white Flycatcher	<i>Cyanoptila cyanomelana</i>	M1	
146.	Siberian Blue Robin	<i>Luscinia cyanea</i>	M3	
147.	Oriental Magpie-robin	<i>Copsychus saularis</i>	R1	Nationally threatened.
148.	White-rumped Shama	<i>Copsychus malabaricus</i>	R1	Nationally threatened.
149.	Asian Glossy Starling	<i>Aplonis panayensis</i>	R3	
150.	Purple-backed Starling	<i>Sturnus sturninus</i>	M3	
151.	Common Myna	<i>Acridotheres tristis</i>	R2	
152.	Javan Myna	<i>Acridotheres javanicus</i>	R3	
153.	Hill Myna	<i>Gracula religiosa</i>	R3	
154.	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	V1	
155.	Barn Swallow	<i>Hirundo rustica</i>	M3	
156.	Pacific Swallow	<i>Hirundo tahitica</i>	R3	
157.	Red-rumped Swallow	<i>Hirundo daurica</i>	M2	
158.	Asian House-martin	<i>Delichon dasypus</i>	M1	
159.	Straw-headed Bulbul	<i>Pycnonotus zeylanicus</i>	R2	Globally/nationally threatened.
160.	Black-headed Bulbul*	<i>Pycnonotus atriceps</i>	R1	Confined to CCNR.
161.	Black-crested Bulbul	<i>Pycnonotus melanicterus</i>	IR2	
162.	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	IR2	
163.	Yellow-vented Bulbul	<i>Pycnonotus goiavier</i>	R3	
164.	Olive-winged Bulbul	<i>Pycnonotus plumosus</i>	R3	
165.	Cream-vented Bulbul	<i>Pycnonotus simplex</i>	R2	Forest dependent.
166.	Red-eyed Bulbul*	<i>Pycnonotus brunneus</i>	R2	
167.	Buff-vented Bulbul*	<i>Iole olivacea</i>	R1	Confined to BTNR.
168.	Streaked Bulbul	<i>Ixos malaccensis</i>	V1	
169.	Ashy Bulbul	<i>Hemixos flavala</i>	M1	
170.	Yellow-bellied Prinia	<i>Prinia flaviventris</i>	R1	
171.	Pallas's Warbler	<i>Locustella certhiola</i>	M1	

No.	Common Name	Species	Status	Remarks
172.	Common Tailorbird	<i>Orthotomus sutorius</i>	R1	
173.	Dark-necked Tailorbird	<i>Orthotomus atrogularis</i>	R3	
174.	Rufous-tailed Tailorbird	<i>Orthotomus sericeus</i>	R2	
175.	Inornate Warbler	<i>Phylloscopus inornatus</i>	M1	
176.	Arctic Warbler	<i>Phylloscopus borealis</i>	M3	
177.	Eastern Crowned-warbler	<i>Phylloscopus coronatus</i>	M2	
178.	White-crested Laughingthrush	<i>Garrulax canorus</i>	IR1	
179.	Hwamei	<i>Garrulax canorus</i>	IR2	
180.	White-chested Babbler	<i>Trichastoma rostratum</i>	R1	Nationally threatened.
181.	Abbott's Babbler	<i>Malacocincla abbotti</i>	R2	
182.	Short-tailed Babbler	<i>Malacocincla malaccensis</i>	R3	Forest dependent.
183.	Moustached Babbler*	<i>Malacopteron magnirostre</i>	R1	Confined to CCNR.
184.	Chestnut-winged Babbler*	<i>Stachyris erythroptera</i>	R2	
185.	Striped Tit-babbler	<i>Macronous gularis</i>	R3	
186.	Thick-billed Flowerpecker	<i>Dicaeum agile</i>	V1	
187.	Yellow-vented Flowerpecker*	<i>Dicaeum chrysorrheum</i>	R1	
188.	Orange-bellied Flowerpecker	<i>Dicaeum trigonostigma</i>	R3	
189.	Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>	R2	
190.	Plain-throated Sunbird	<i>Anthreptes malacensis</i>	R2	
191.	Purple-throated Sunbird	<i>Neactarinia sperata</i>	R2	
192.	Olive-backed Sunbird	<i>Nectarinia jugularis</i>	R1	
193.	Crimson Sunbird	<i>Aethopyga siparaja</i>	R3	
194.	Little Spiderhunter	<i>Arachnothera longirostris</i>	R3	Forest dependent.
195.	Thick-billed Spiderhunter*	<i>Arachnothera crassirostris</i>	R1	Confined to CCNR.
196.	Yellow-eared Spiderhunter	<i>Arachnothera chrysogenys</i>	R1	Nationally threatened.
197.	Eurasian Tree-sparrow	<i>Passer montanus</i>	R1	
198.	Forest Wagtail	<i>Dendronanthus indicus</i>	M2	
199.	Yellow Wagtail	<i>Motacilla flava</i>	M1	
200.	Grey Wagtail	<i>Motacilla cinerea</i>	M1	
201.	Paddyfield Pipit	<i>Anthus rufulus</i>	R2	
202.	Baya Weaver	<i>Ploceus philippinus</i>	R1	
203.	White-rumped Munia	<i>Lonchura striata</i>	R1	Nationally threatened.
204.	Javan Munia	<i>Lonchura leucogastroides</i>	IR1	
205.	Scaly-breasted Munia	<i>Lonchura punctulata</i>	R2	
206.	Black-headed Munia	<i>Lonchura malacca</i>	R1	
207.	White-headed Munia	<i>Lonchura maja</i>	R2	

Part B: Species that are suspected to be escapees.**No. Common Name**

1. Red Junglefowl
2. Oriental Pied Hornbill
3. Black Magpie
4. Red Lory
5. Black Hornbill
6. Sooty-headed Bulbul
7. Milky Stock
8. Painted Stock
9. Great Argus
10. Australian Pelican
11. Azure-winged Magpie
12. Green Wood-hoopoe
13. Grey Treepie
14. Silver-eared Mesia
15. Black-winged Starling

Part C : Species which are of doubtful status. i.e., their origin cannot be ascertained.**No. Common Name**

1. Grey-headed Canary-flycatcher
2. Red-bearded Bee-eater
3. Red-throated Barbet
4. Mountain Imperial Pigeon
5. Maroon Woodpecker